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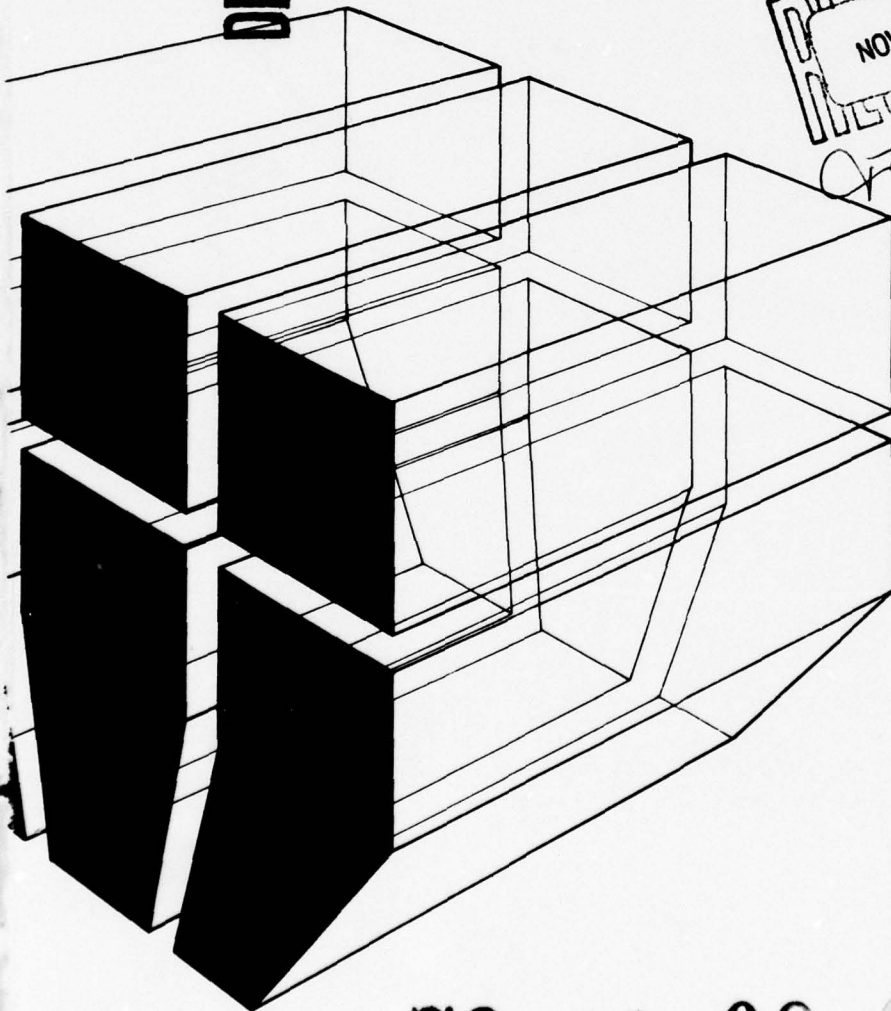
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MANAGEMENT SUMMARY: FACILITIES ENGINEERING
EQUIPMENT MAINTENANCE SYSTEM
(FEEMS)

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need to use separate work order, labor, equipment, and material reporting systems; however, it is imperative that the Facilities Engineer (FE) develop a thorough plan for recurring maintenance before implementing the system.

This report provides an overview of the FEEMS functions, implementation procedures, and benefits and costs related to the system. The FE can use this report to evaluate the potential application of FEEMS to a given situation and to evaluate the requirements for such an application.

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FOREWORD

This research was conducted for the Directorate of Facilities Engineering, Office of the Chief of Engineers (OCE), under Project 4A762719AT41, "Design, Construction, and Operation and Maintenance Technology for Military Facilities"; Task T9, "Facilities Operation and Maintenance"; Work Unit 030, "Facilities Engineer Equipment Maintenance System." The work was performed by the Facility Systems Division (FS), U.S. Army Construction Engineering Research Laboratory (CERL), Champaign, IL.

The study was conducted under the general supervision of Mr. D. W. Brown, Principal Investigator, and Mr. E. A. Lotz, Chief of FS. The OCE Technical Monitors were Mr. J. C. Malone and Mr. B. M. White (DAEN-FEM-F). COL J. E. Hays is Commander and Director of CERL, and Dr. L. R. Shaffer is Technical Director.

Appreciation is extended to R. Colver, L. Tietz, J. Nay, L. Lawrie, V. Conway, and E. Japel of CERL and to Howard Moore and Helen Attebery of the Hospital Support Division, Facilities Engineering, Fort Gordon, GA, for their contributions throughout the development of FEEMS. Appreciation is also extended to the Management Information System Offices at Fort Detrick, MD, and at Walter Reed Army Medical Center for the cooperation and computer time provided to test FEEMS.

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MANAGEMENT SUMMARY: FACILITIES ENGINEERING EQUIPMENT MAINTENANCE SYSTEM (FEEMS)

1 INTRODUCTION

Purpose

The purpose of this report is to give the Facilities Engineer (FE) an overview of the Facilities Engineering Equipment Maintenance System (FEEMS) in order to establish the degree to which the system will be useful to a specific installation. The report provides an overview of the FEEMS functions, implementation requirements, and benefits and costs related to the system.

Background

Because FEs do not have the resources to schedule and monitor all recurring maintenance activities of a critical nature (i.e., maintenance of equipment which will fail if not maintained at specified frequencies), augmentation of the Integrated Facilities System (IFS) was deemed necessary to improve the reliability and safety of equipment. In 1976, the Office of the Chief of Engineers (OCE) tasked the Construction Engineering Research Laboratory (CERL) with developing an automated system for scheduling and monitoring recurring maintenance activities. FEEMS was designed using the Hospital Equipment Maintenance System (HEMS) which CERL had already successfully prototype-tested at Fort Gordon, GA. FEEMS, which significantly increased the capabilities available in HEMS to schedule and monitor maintenance activities, was tested at Fort Detrick, MD, in March 1978. FEEMS was designed to be fully interfaced with IFS, and OCE will implement the system as an augmentation of IFS.

Outline of Report

Chapter 2 describes the components of FEEMS and their purpose and role within the system. Chapter 3 provides instructions for implementing FEEMS and describes ways to insure maximum use of the system's capabilities. Chapter 4 outlines how the FE will benefit by using FEEMS and lists the costs that will be incurred. Chapter 5 presents conclusions drawn from the study. Appendix A defines FEEMS terms used frequently throughout this report. Appendix B gives examples of source documents. Appendix C provides some sample FEEMS output reports. Appendix D shows the standard SEID-NO Subfield codes, and Appendix E gives examples of a Standard Maintenance Procedure format.

Mode of Technology Transfer

CERL will provide the Department of the Army (DA) with the FEEMS system documentation, including a user's manual, operator and scheduling manual, system analysis, and program documentation. OCE will transfer FEEMS to installations using IFS through technical manuals and training courses. The Computer Systems Command (CSC) will be responsible for implementing FEEMS in the field and maintaining the FEEMS computer programs.

2 MANAGEMENT OVERVIEW

FEEMS, a subsystem of the Facilities Engineering Management System (FEMS) module, is a part of the first increment of IFS. FEEMS is designed to support the FE by providing an automated management tool for identifying, scheduling, monitoring, recording, and analyzing recurring maintenance activities for selected systems and equipment. FEEMS automatically produces monthly work orders and records a history of the work accomplished obtained from FEEMS feedback. The FE can use the information provided to analyze resource requirements and equipment performance. FEEMS may be used to define the recurring maintenance program which best fits the installation's facilities and maintenance resources. Through use of FEEMS, the FE can expect to reduce recurring maintenance planning time and increase the capability of monitoring and analyzing maintenance activities. Depending on how extensive the recurring maintenance program is, the FE should be able to provide safer and more reliable equipment/facilities while increasing productivity. FEEMS may be used as an automatic control to properly schedule the right maintenance at the right time. Emergency work and major repairs should be substantially reduced when equipment is serviced and repaired on a scheduled basis. The FEEMS History File also provides the capability of analyzing past equipment maintenance performance.

Maintenance Management Support

FEEMS supports five basic maintenance management functions: inventory control, maintenance control, resource management—scheduling/processing, resource management—planning, and historical recordkeeping (see Figure 1). Examples of FEEMS source documents and generated output are provided in Appendices B and C, respectively.

Inventory Control

Systems and equipment inventory are controlled by the Select Equipment List (SEL) master file, which contains classification, identification, location, costs, and reference data on all maintained systems/equipment. The FE may select all or any number of systems/equipment to be included in the SEL. Data required for FEEMS operation are minimized to facilitate use of the system in an older facility where equipment identification and cost data may be difficult to obtain. Only the Select Equipment Identification Number (SEID-NO), Facility Number/Suffix, and certain critical categorization data are required for FEEMS operation. Reimbursable Code, and Other Fund Citation Code will be validated against records in the IFS files. Two SEL input data fields are edited by FEEMS in accordance with the edit tables supplied by the FE: System Type Code and Equipment Type Code. Additional identification (Manufacturer Name, Serial Number, etc.) and cost data may be added at the option and convenience of the FE. The FE controls the SEL inventory by adding to, deleting from, and updating it, using the FEEMS SEL and FEEMS SEL-Additional Data forms. The FE requests the SEL only when required for checking the inventory. Each report presents the inventory by sorting either by one of the SEID-NO subfields or by Facility Numbers. A current copy of each report should be obtained at least annually or whenever major revisions are made to the SEL. Maintained systems/equipment inventory contents may be reviewed on one or more of five SEL optional reports:

1. System Type List Report. This report controls the systems and the assigned System Type Codes used in FEEMS.

2. System Number List Report. This report is designed to control the installation-unique System Numbers and associated descriptions used in FEEMS to prevent duplication.

3. Maintained Equipment Type List Report (Master SEL). This report provides all the inventory data entered the SEL, thus establishing a complete inventory for FEEMS.

4. Maintained Equipment Number List Report. This report may be used to monitor the installation-unique Equipment Numbers assigned by the FE to avoid duplication.

5. Maintained System/Equipment List by Facility Report. This report contains the SEL records by SEID-NO for each Facility Number/Suffix and provides locational control for the FE.

Maintenance Control

FEEMS controls recurring maintenance activities through the Maintenance Requirement/Procedure (MRP) Master File. This file enables the FE to monitor the active recurring maintenance, Standard Maintenance Procedures (SMP). The MRP contains maintenance description, responsible shop, frequency, crew size, and labor hour standard data from the SMP. Input from the MRP comes from the first page of the SMP—the Maintenance Requirement/Procedure (MRP) Form. To insure complete control over the selected FEEMS Maintenance Requirement/Procedures, the FE must establish a policy whereby each SMP is entered into the MRP Master File and each MRP Form has an associated SMP. Each SMP (and subsequent MRP record) is uniquely identified by an MRP Number and a Sequence Number. The MRP Number identifies a specific SMP or set of SMPs to be performed serially (in sequential order) or concurrently by different shops. MRP input data fields for System Type Codes and Equipment Type Codes are edited using the tables established in the SEL. This insures appropriate matches between the SEL and the MRP. Each SMP is written for a specific shop and the Shop Code in the MRP record is validated automatically by FEEMS, using records in IFS files. The FE controls the selected MRP by adding to, deleting from, and updating it by completing the FEEMS Maintenance Requirement/Procedure Form. The MRP reports are requested as required by the FE to check the MRP inventory. Each report presents the MRP inventory through sorting by unique MRP number, Shop Code, or the associated SEID-NO. A current copy of each report should be obtained at least annually or whenever major revisions are made to the MRP. Contents of the MRP file may be reviewed in one of three optional MRP outputs:

1. Maintenance Requirement/Procedure List by Shop Report (Master MRP List). This report is the master control list for the MRP, since it is the complete list of all the MRP input data. The FE will be able to check the MRPs designated for each shop.

2. Maintenance Requirement/Procedure List by SEID-NO Report. This report facilitates checking the SMP input and the SEID-NO used to match the MRP with the SEL.

3. Maintenance Requirement/Procedure List by MRP-NO Report. This report may be used as an index to the SMPs and a reference guide to the MRP numbers currently in use. Careful review will insure that duplicate numbers are not assigned.

Resource Management - Scheduling/Processing

FEEMS Resource Management - Scheduling/Processing is accomplished monthly through the Task Master File. FEEMS automatically produces IFS transactions (FA1, FA2, FB1, FC1, FD1, and FD2) in punchcard format to be entered with other IFS work orders. This insures that IFS contains a complete record of all maintenance to be performed by the FE. The task file contains all recurring maintenance tasks with their current due dates. When the SEL and MRP records are matched, the appropriate tasks are assembled into work order phases. The FEEMS work orders should be scheduled to the shops with the other non-FEEMS workload requirements. The FE assigns the priorities and determines which work orders will be accomplished based on available resources. Unlike other work orders, the FEEMS work order has a limited life. Each task on a work order must be accomplished in the allotted time interval or it is cancelled and rescheduled. This eliminates a backlog of FEEMS work. Cancellation is accomplished by phase (a grouping of tasks) depending on the Frequency Cycle of phased tasks. FE personnel report resource expenditures on IFS Labor and Equipment Utilization cards and Material Issue cards in the same manner as any individual job order. Resources are reported by work order phase and recorded in the IFS Job Master File (FMJ). FEEMS retrieves these data from IFS, matches them against their appropriate tasks in the task file, and prorates the expended resources on the basis of an individual task Labor Hour Standard for historical purposes. Based on the Labor and Equipment Utilization input records, FEEMS will automatically record work orders as either completed or deleted. Since FEEMS cancels phases which are not accomplished in the appropriate time frame, a FEEMS Work Order will be recorded in IFS as complete whenever any labor or material costs are recorded. However, if FEEMS cancels all phases within a work order in which no labor hours or costs were recorded, then FEEMS will delete the work order from IFS. This process of recording FEEMS work orders as completed or cancelled is based on the philosophy of not creating a backlog of recurring work by scheduling a task only once in a given month for a specific item of equipment. If a work order is recorded in IFS as complete, but not all tasks have been completed, FEEMS will prorate the hours only against the tasks actually completed and

automatically reschedule the unaccomplished tasks in the next monthly computer run.

Resource Management - Planning

FEEMS supports Resource Management - Planning by providing three different presentations of FEEMS workload in the FEEMS Unaccomplished Task List Report, the FEEMS Work Order Status Report, and the FEEMS Yearly Workload Projection Report. These reports are influenced by changes in the SEL, MRP, and the resource expenditure information submitted against the work order phases.

The FEEMS Unaccomplished Task List Report. This report is generated monthly and lists all tasks scheduled by FEEMS for each shop which were not completed within the designated time interval, i.e., cancelled by FEEMS. This provides the FE with a review of actual performance against the established recurring maintenance workload. FEEMS records completion of tasks by phase. If FEEMS cancels a phase, all tasks within that phase will be listed as unaccomplished. However, FEEMS provides the FE with a tool to purge the Unaccomplished Tasks List of completed tasks which were included in cancelled phases. The FEEMS Work Order Report may be used as a Task Accomplished Turnaround Document to provide an up-to-date record of task completion within the system. In this manner, tasks may be recorded as complete whether the phase is completed or cancelled by IFS/FEEMS. The remaining unaccomplished tasks are the workload by shop which was not accomplished because of the lack of available resources. The FE should put special emphasis on accomplished tasks or on revising Maintenance Requirement/Procedures (especially Frequency of Maintenance) of tasks which consistently appear on the FEEMS Unaccomplished Tasks List Report. The workload which cannot be accomplished in each shop is documented on this report and will provide the FE with a tool to establish the requirements for additional resources.

FEEMS Work Order Status Report. This report provides the FE with a review of all FEEMS work currently scheduled to the shops. The FEEMS work is identified for each shop by appropriate Document Number, Phase Code, and Frequency Cycle (monthly, bi-monthly, etc.). The report divides the scheduled work into the following four categories for each shop:

1. The New Work Order Phases section lists the new work for a specific shop for the current month.

2. The In-Progress Work Order Phases section lists the work order phases which have been previously generated by FEEMS, but which have not yet been completed or cancelled.

3. The Completed Work Order Phases section lists the work order phases performed and completed during the past month by each shop.

4. The Cancelled Work Order Phases section lists the work order phases which were not completed in the allotted time interval.

FEEMS Yearly Workload Projection Report. This optional report provides the total projected FEEMS workload for a 12-month period. The FE should request this report quarterly or when the SEL or MRP is changed significantly. The FEEMS Yearly Workload Projection Report presents FEEMS workload in terms of estimated standard hours for each month during the year. The FE may examine this report to see how the FEEMS workload will be scheduled if all the work is accomplished during a scheduled month. The hours scheduled for each month can be compared to the manhours available to perform the work in each shop. The work overloads and underloads may be adjusted by shifting scheduled work to the following month for actual accomplishment. Because of the nature of the FEEMS rescheduling routine (Date Completed plus the Frequency Cycle), the shift in workload may be reflected in future projections.

Historical Recordkeeping

The History Master File provides historical records of FEEMS recurring maintenance, correction/repair maintenance, and operating hours for each item of maintained system/equipment. Inputs are provided internally by FEEMS and externally by the FE. FEEMS recurring maintenance records are generated by the FEEMS Resource Management-Process. The History File contains a record of each accomplishment of a FEEMS task. Correction/repair maintenance (not performed using FEEMS work orders) may be recorded for a maintained system/equipment on a FEEMS Correction/Repair Record form at the discretion of the FE. This input data is entered directly into the History File during a FEEMS monthly run. As an alternative, the FE can identify work orders (IJO or SO) at the time IFS transactions FC1, FDI, and FL1 are prepared; these transactions designate the work orders that will be recorded as correction/repair entries against specific maintained systems or equipment in the FEEMS History File. FEEMS will then automatically retrieve the labor

and material data as it is recorded in IFS. The FE should record correction/repair maintenance records for only maintained systems or equipment where total maintenance costs are desired. The History File provides a total of the labor hours and costs for FEEMS recurring maintenance and correction/repair maintenance. Equipment operating hours (estimated and actual) are recorded for each maintained system/equipment. The estimated value is the Equipment Estimated Used Hours field recorded on the SEL master record and the actual value is the optional input from the FEEMS Operating Hour/Log for a given month. The operating hour input is also used to convert maintenance frequencies measured in hours to a monthly Frequency Cycle. Since the History File is not updated in the usual manner (add-change-delete), the FE can note changes and errors only by using the FEEMS Update Comment Form. Comments entered in this manner will also be retrieved with the appropriate maintained system/equipment information to inform the reader that changes have occurred. The History File records are available to the FE on either the FEEMS History Detail Report or the FEEMS History Summary Report. The FEEMS History Detail Report contains a complete list of all tasks and entries against the maintained system and equipment records. The History Summary Reports provide only bottom-line totals. The FE chooses from the following seven parameters (he/she may choose as many as needed at one time); these parameters indicate the system/equipment history records to be retrieved.

1. Parameter "1" indicates a request for all of the History File records.

2. Parameter "2" indicates a request for a specific EQUIP-NO.

3. Parameter "3" indicates a request for the records of all maintained systems having a particular System Type Code.

4. Parameter "4" indicates a request for all the history records for maintained systems having a specific System Number.

5. Parameter "5" indicates a request for all the history records having a specified Equipment Type Code.

6. Parameter "6" indicates a request for records having a specified System Type Code in combination with a specified Equipment Type Code.

7. Parameter "7" indicates a request for equipment records having a specified System Number in combination with a specified Equipment Type Code.

The FE may choose one or more of these parameters to obtain the History File records which are to be reported. The entire History File should be obtained at least once annually by requesting Parameter "1." However, since the entire History File can be quite large, the other parameters should be used throughout the year to obtain only those records which are required.

IFS Interface

FEEMS interacts on a monthly basis with FEMS and with the Assets Accounting (AA) module of IFS. FEEMS monthly processing automatically produces punchcard output to record work orders created by FEEMS (transactions FA1, FA2, FB1, FC1, FD1, and FD2). The labor and equipment hours and the cost associated with performing FEEMS Work Orders are recorded by phase directly into IFS, using the IFS Labor and Equipment Utilization cards and Material Issue cards. During the monthly FEEMS processing, FEEMS reads the IFS files and obtains the appropriate labor, equipment, and material data for the FEEMS Task File. FEEMS will continue to look for labor hours and costs associated with each FEEMS Work Order phase until 30 days after the phase has been accomplished. FEEMS will automatically provide punchcard output for IFS to record completion and deletion of FEEMS work orders. In addition, it will automatically obtain from IFS the data for IFS work orders designated by the FE as FEEMS correction/repair records. The system validates IFS codes used in the system against the appropriate IFS files.

Responsibilities

Establishment and maintenance of FEEMS at an installation is a responsibility of the Director of Facilities Engineering. The FE may wish to delegate authority for establishment and maintenance of the system to the IFS project officer and/or Division Chiefs. The FE is responsible for:

1. Maintaining the functional aspects of FEEMS
2. Establishing the SEL inventory
3. Establishing the Standard Maintenance Procedures
4. Establishing the FEEMS coding structure

5. Preparing of all input records

6. Maintaining the flow of work processing

7. Evaluating output reports.

3 IMPLEMENTATION PROCEDURES

Implementation Requirements

FEEMS has been designed as a subsystem to the FEMS module of IFS. FEMS establishes the precedent for all codes which are used in both FEEMS and FEMS; for example, Component Codes, Facility Number/Suffix Codes, Requestor Identification Codes, Reimbursable Codes, and Shop Codes. Figure 2 shows the initial implementation process.

Establishing the Select Equipment List Inventory

The FE must decide how FEEMS will be used. He/she establishes the inventory for the FEEMS Select Equipment List by selecting the desired systems and equipment for which recurring maintenance activities should be monitored. FEEMS can be applied to either one complex facility, such as the hospital, or to an unlimited number of facilities. The FE must weigh the benefits and requirements for automating recurring maintenance activities resource management for each facility against what is considered to be a manageable and justifiable recurring maintenance workload. FEEMS has been designed as a tool for maintaining complex facilities that contain critical installed systems or equipment. However, it may be used for any systems or equipment requiring recurring maintenance. The FE should code the FEEMS data in accordance with IFS instructions and with consideration for all the equipment on the installation. FEEMS should be established for the most critical facilities first; other facilities can be added later after experience with FEEMS procedures is acquired. The SEL may be limited to only those critical items which must not fail or to all items requiring recurring maintenance. To establish the system/equipment inventory for each facility would require substantial effort. The level of effort required can be limited initially by including the system/equipment for a small number of facilities in FEEMS and establishing a phased program to add facilities. The systems/equipment within a given facility may also be added in phases, starting with the most critical and progressing to the least critical. The SEL may be used as a complete

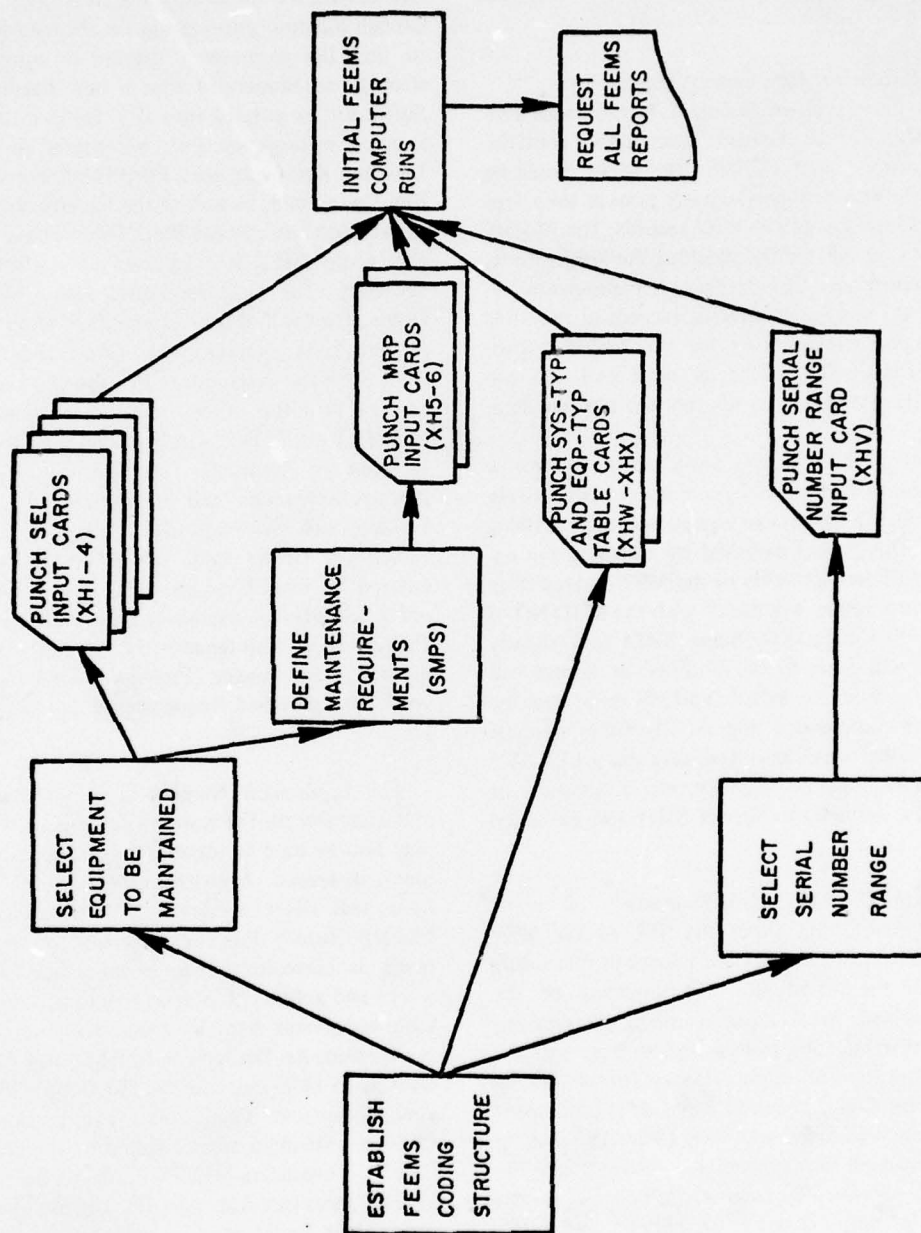


Figure 2. FEEMS initial implementation flowchart.

system/ equipment inventory control by including all the systems/equipment for which the FE has responsibility; however, only the SEL records matching MRP records will result in FEEMS Work Orders. This could make the SEL very large, but will not necessarily affect the remainder of FEEMS processing, since the number of FEEMS Work Orders is a function of both the MRP and the SEL.

Establishing Standard Maintenance Procedures

The FE must prepare Standard Maintenance Procedures (SMPs) for the recurring maintenance activities to be monitored under FEEMS. The SMPs should be maintained in a three-ring notebook in each shop area and entered into FEEMS as MRP records. The FEEMS Work Orders are created by matching the MRP records with the appropriate SEL records. If maintenance requirements do not match specific records in the SEL, FEEMS cannot create tasks for the FEEMS Work Orders. FEEMS will produce an audit trail that will identify SEL and MRP records that are not matched.

Each SMP may be written for a specific system or equipment item, such as oiling a motor, or collectively for any number of systems or equipment, such as oiling all motors. This is accomplished by assigning the appropriate SEID-NO subfields to the MRP derived from the SMP; this number will match with the SEID-NO of the desired SEL record(s). Some SMPs may already exist; these will have to be modified in format and possibly in content to satisfy FEEMS input requirements. It is recommended that the FE obtain available SMPs from other installations already using FEEMS.* FEEMS can be implemented with only a minimum of critical SMPs defined; additional SMPs can be added later.

Establishing the FEEMS Coding Structure

Prior to establishing either the SEL or the MRP (SMP), the FE must consider the impact of the coding structure on the scheduling and reporting of the FEEMS workload. To schedule recurring maintenance for specific systems/equipment properly, it is necessary to establish the appropriate combinations of the Facility Number/Suffix Code, Location Key Code, Equipment Number, System Number, and Shop Code. The Facility Number identifies the appropriate facility, and the Suffix Number identifies sections, floors, or rooms within a given facility. The Facility Number and Suffix

Number are used together to identify the complete Facility Number and must be obtained from IFS records. The Facility Number/Suffix is the key to establishing the FEEMS Work Order phase and will be used by the maintenance crew to locate the system or equipment to be maintained. If the appropriate Facility Number/Suffix obtained from IFS does not provide enough location information for the maintenance crew to find the maintained system or equipment, it is strongly recommended that a new Facility Number/Suffix *not* be entered into IFS. Instead, the additional location information may be entered in the FEEMS Location Key Code field. FEEMS will use the Location Key Code Field, as well as the Facility Number/Suffix to establish the FEEMS Work Order phase. A Location Key Code Field is to be used only when absolutely necessary. The tasks assembled into a FEEMS Work Order phase will also be grouped by Shop Code, Component Code, Reimbursable Code, and Other Fund Citation. (The Accounting Processing Code [APC] is entered into the other fund citation field.) A set of FEEMS Work Orders will be established for each combination of Requestor Identification Code in the Document Number and the Functional Group Code. FEEMS will automatically retrieve the appropriate Functional Group Code from the Facility Numbers entered by the FE on the SEL records. A new work order will also be established for each change in the Frequency of Maintenance, i.e., monthly, bi-monthly, quarterly, and longer (Frequency Unit Code, M, H), and/or for specified frequencies (Frequency Unit Code R).

The Equipment Number is an installation-unique identification for the system's equipment. This number may also be used to identify a group of similar equipment, if desired. Aggregation of individual equipment items will affect the level of detail available in the FEEMS History File, i.e., the ease of entering such items as correction/repair maintenance (non-FEEMS work) and actual equipment operating hours. Locating each equipment item may also be hindered by this aggregation. An Equipment Number may only be used once in FEEMS and must be identified with an associated Equipment Type Code. The Equipment Type Code is a standard code assigned by the Office of the Chief of Engineers (DAEN-FEM) to be used by all FEEMS users (see Appendix D). The use of new Equipment Type Codes must be coordinated with DAEN-FEM.

The System Number is an installation-unique identification for maintained systems (for example, utility

*SMPs are available from DAEN-FEM or from Fort Gordon, GA.

systems). These numbers may be used to define general types of systems within a given System Type Code, to indicate the location of a system within a facility, or a combination of both. Again the choice may affect the level of FEEMS history detail, the ease of scheduling, or the ease of the SMP preparation. The associated System Type Code is a standard code assigned by DAEN-FEM, and a request for additional codes must be coordinated with this office (see Appendix D).

These primary codes define the basic FEEMS coding structure and have the greatest impact on the degree to which FEEMS can provide a tool for scheduling, monitoring, and recording recurring maintenance activities. A change in the basic coding structure because of unforeseen identification problems, or because of a change in maintenance philosophy can cause numerous problems and many wasted manhours. FEEMS implementation will benefit greatly from good initial planning.

The Document Number on FEEMS Work Orders is automatically assigned and resembles all IFS Document Numbers, consisting of the Requestor Identification Code, Serial Number, Fiscal Year, and Type Code. The Requestor Identification Code is obtained from the SEL master record, which has been validated against the codes used in IFS. FEEMS automatically assigns the appropriate fiscal year designation, and assigns a "J" for Type Code, since all FEEMS Work Orders are individual job orders (IJO). The FE must assign a unique set of serial numbers which will only be used for FEEMS Work Order Document Numbers. To avoid duplication of Document Numbers assigned to other IJOs, the FE records desired Serial Number Range on the FEEMS Serial Number Range Form, which must also include the appropriate Installation Number. By recording the Installation Number, FEEMS will be able to run at multiple DPI installations and thus differentiate between the various installation records. Note that each FE using a multiple DPI must run a separate FEEMS program, i.e., a separate FEEMS program for each Installation Number.

Maintenance Management Initiatives

The following sections discuss management initiatives which will insure maximum use of FEEMS capabilities.

Defining FEEMS Workload

The FE should approach FEEMS workload definition with the idea of formally documenting recurring maintenance requirements. Recurring maintenance workload, which is critical to accomplishing the mission,

ensuring equipment reliability, or protecting the safety of personnel, should be considered first. FEEMS will provide IJO-type visibility to the defined workload and documentation of work performance against the defined schedule. The FE should identify and document the SMPs which will provide critical inspection, replacement, and service to the selected systems and equipment. Initial estimates of the Labor Hour Standards should be based on experience or performance standards, and can be updated from collected data as the system is used. The means of accomplishing the workload is extremely important. Once defined, the workload (SEL and MRP/SMP) should be reviewed and approved by the FE. Approval of individual FEEMS Work Orders will not be required, since their contents are completely controlled by the contents of the SEL and the MRP Master Files. When the workload is approved, the FE should commit resources to its performance. The workload may increase or decrease over time, but it should reflect the FE's definition of critical (and therefore high-priority) activities, if FEEMS is to be an effective tool.

FEEMS Coordinator

The key to effective use of FEEMS capabilities is the ongoing management of the FEEMS workload. The effort required for this job will vary according to the workload's size and nature. It is best if this task is performed by one individual who can monitor and coordinate the entire recurring maintenance program supported by FEEMS. This provides the decision-making and review process with the continuity and cohesion not attainable from a segmented group of individuals. Responsibilities of the FEEMS coordinator should include maintenance of the SEL and MRP Master Files, maintenance of the SMPs and the central records library, assignment of installation-unique identification numbers, review of planning and status reports, analysis of equipment and resource performance, and review of systems feedback from work crews and supply. These activities will help insure that FEEMS will continue to operate effectively and without problems. The FEEMS coordinator should be involved in the initial FEEMS workload definition activities. Once the FEEMS workload coding structure and SMPs are defined, the day-to-day workload of the FEEMS coordinator should be minimal. The IFS project officer may be designated as the FEEMS coordinator.

Numbering Maintained System/Equipment

The FEEMS systems and equipment numbers are installation-unique identifiers which can be used to physically tag and identify installation systems and

equipment. These will greatly facilitate location of specific equipment, familiarity with FEEMS coding requirements, and control of the equipment inventory.

Controlling SMPs

Effectiveness of FEEMS SMPs can be greatly increased by locating copies of pertinent SMPs at or near the maintenance activity. This will complicate updating the SMPs, but should increase work crew effectiveness. When changes are made to SMPs, the central (master) SMP book should include a list of locations of the distributed copies to facilitate recording changes in them. Care must be taken to insure that all MRP Forms have associated SMPs and vice versa. Lack of proper control can result in an incomplete FEEMS workload, the lack of a ready reference for work crews and the possibility of critical work remaining undone. If possible, the SMP should be cross-referenced to key manufacturing literature in a central library located near the master SMP and/or shop. This facilitates quick and direct reference to operating and assembling instructions, spare parts information, and detailed repair information not necessarily contained in the SMP. Examples of the SMP are provided in Appendix E.

Planning Maintenance

Since FEEMS is a recurring maintenance system, SMPs and scheduled tasks do not cover correction/repair maintenance activities. However, FEEMS may periodically schedule maintenance tasks to inspect and assess the current condition of the maintained system/equipment. When deficiency or repair requirements are identified, there should be a procedure for generating a correction/repair work order (IJO or SO). If the work crew is properly equipped and skilled, and the requirement is an emergency, the correction/repair can be made immediately as an emergency service order. If the crew cannot make the correction or if it can be postponed, it should be scheduled in IFS as a plan correction action.

Scheduling FEEMS Maintenance

Although monthly FEEMS Work Orders are produced automatically, the FE retains control over the basic schedule by controlling when the work is accomplished and when new requirements are added to the FEEMS workload. Because the FEEMS tasks are rescheduled by adding the Frequency Cycle to the month the work was accomplished, the FE can shift workloads by delaying accomplishment. However, note that delaying accomplishment for more than 1 or 2 months may cause task cancellation. In this case, FEEMS will then reschedule the work for the month following the cancellation and list the associated task on the FEEMS

Unaccomplished Task List report. Note that FEEMS tasks cannot be shifted individually; only the work order phase can be delayed, and this shifts the schedule on all tasks in that phase (unless tasks are listed as complete, using the FEEMS Task Accomplished Turnaround Record). New tasks added to the FEEMS workload will be scheduled for the month immediately following their addition (except tasks with frequencies in specified months). If their accomplishment must be delayed, their addition to the workload should also be delayed. For example, the newly installed item of equipment probably does not require a quarterly oiling the first month. The FE could use this task to just check the item of equipment for proper operation, or just record the task as complete on the FEEMS Task Accomplished Turnaround Record. Once a reasonable schedule of tasks has been established, the FE should strive to maintain it. FEEMS has built-in flexibility for up to 2 months of delay; however, such delay will affect the future schedule. To maintain the schedule, the FE must insure that the work is accomplished in the scheduled month by assigning it a sufficiently high priority so that resources, such as labor or materials, are received. If this cannot be done, the scheduler must insure that the work is accomplished in the allotted time interval, so that it will not be cancelled and reported on the FEEMS Unaccomplished Task List Report. To do this, the scheduler must insure that any monthly phase on the given month's work order, any bi-monthly phases on the previous month's work orders, and any quarterly phases on the work orders 2 months old receive sufficient priority to be accomplished in the current month. It should be noted that when FEEMS Work Orders are issued, they must be used until they are completed or cancelled, since FEEMS does not reissue work orders for work in progress. The FE should try to schedule and accomplish FEEMS tasks, especially monthly tasks, at approximately the same time each month; otherwise, the time between accomplishing the task may not be in accordance with the assigned Frequency of Maintenance. For example, accomplishing a task in the fourth week of January and again in the first week of February would not allow a month between performance of the tasks. Also, completion of a monthly task in the first week of January and then again the last week of February would result in almost 2 months between completion dates. The MRP Remarks field appears on the FEEMS Work Order and may be used to record the target day of the month established by the scheduler to accomplish the SMP. Review and coordination of FEEMS management-planning reports can greatly facilitate this process. Review and use of these reports insures that the FEEMS

coordinator and shop foreman can level workload, assure accurate estimates, and maintain direct control of the FEEMS workload.

4 FEEMS BENEFITS AND COSTS

Benefits

Most FEs do not have a viable recurring maintenance program. The primary benefit of FEEMS is to provide the FE with the capability to plan recurring maintenance activities to control and manage the maintenance workload, reduce equipment failure and downtime, decrease overtime requirements, and increase customer satisfaction.

The FE will realize a savings in terms of manhours dedicated to repetitive planning, estimating, and recording of recurring maintenance tasks; these freed manhours can be used to perform other maintenance tasks. It is estimated that FEEMS will save the FE at each installation an average of 6000 manhours per year, representing 55,000 labor dollars which can be spent on other tasks. These manhours are a summary of many partial manhours and do not represent one position that can be eliminated.

FEEMS is a formal system which provides the capability to plan and schedule critical recurring maintenance well in advance of need. Current procedures are not adequate to perform functions because the maintenance staff is kept too busy responding to emergencies to take time for routine planning, scheduling, and recordkeeping.

FEEMS provides feedback not previously available to the FE which will help estimate equipment service life and abandonment criteria and help make repair/replace decisions. The result is an increased capability to plan and document workload and increase work force productivity.

FEEMS will provide fully documented standard maintenance procedures; these include maintenance requirements by frequency, shop standard tools and parts required but not usually carried by the maintenance crew, and exact equipment location.

FEEMS will greatly reduce overlapping duties and responsibilities by requiring the identification of what,

where, when, how, and who will perform the maintenance.

Craftsmen's job satisfaction and productivity will increase because work will be scheduled rather than performed on a "hit or miss" basis; in addition, emergency work, which can be avoided with proper maintenance, will be reduced.

FEEMS automatically generates authorized work orders, thus eliminating the manual preparation of work order requests and estimates. FEEMS will automatically record and report the status of all FEEMS Work Orders as new, in-process, completed, or cancelled.

FEEMS will provide a standardized method for equipment identification.

The FE will be able to achieve a higher level of customer satisfaction.

Costs

The cost of operating FEEMS is minimal. It is estimated that the FE can implement the system for equipment identified as critical in approximately 1 month at a one-time cost of \$3200 (an estimated 160 hours \times \$20/hr). Additional equipment items and SMPs can be added as desired with minimal impact on the system. FEEMS will have an average computer run time of between 1 to 1½ hours/month on a BASOPS, IBM 360-40. The computer costs are estimated to range from \$90 to \$135/month (computer time estimated at \$90/hr).

5 SUMMARY AND CONCLUSIONS

This report identifies five basic maintenance management functions: (1) inventory control, (2) maintenance control, (3) resource management—scheduling/processing, (4) resource management—planning, and (5) historical recordkeeping and implementation requirements to establish the FEEMS SEL inventory and SMPs. This overview of the system's functions and requirements will help the FE determine the need and degree to which the system will be useful to the installation.

The benefits and costs of using FEEMS indicate that the advantages of implementing the system more than outweigh the minimal costs. FEEMS is a tool to help the FE establish a viable recurring maintenance program.

APPENDIX A: GLOSSARY

Correction/Repair Maintenance Activities are maintenance actions necessary to restore a system/equipment to operating condition. These maintenance actions are for repairing breakdowns or failures and cannot be routinely predicted and scheduled by FEEMS processing (i.e., this is non-FEEMS work).

Frequency Cycle is the time interval used by FEEMS to schedule and reschedule maintenance tasks. A specified frequency (R) has a Frequency Cycle code "0," monthly cycle code "1," bi-monthly cycle code "2," and quarterly or longer cycle "3." When a maintenance task is completed, it will be rescheduled in accordance with the Frequency Cycle code from the date of completion. If the maintenance task is not completed as scheduled in the allowable time frame, it will be cancelled and rescheduled until it is accomplished (specified frequencies are rescheduled only in the months designated).

Frequency of Maintenance specifies how often maintenance tasks will be scheduled and will establish the Frequency Cycle. This frequency may be specified as intervals in months or hours in which maintenance will be scheduled.

The History File records a complete history of recurring maintenance on each maintained system/equipment record in the Select Equipment List Inventory File. The FE has the option to record and store in the History File the Actual Equipment Operating Hours and Correction/Repair Maintenance Activities. The History File cannot be updated directly. However, the FE may enter comments to identify any changes or corrections that should be noted. When a history report is desired, it must be specifically requested, using the Select Equipment Identification Number.

Labor Hour Standard is the estimated number of labor hours required to accomplish the maintenance requirement. The Labor Hour Standard is multiplied by the Number of Items to be maintained to establish the estimated labor hours for the maintenance task. This estimate includes time for material handling, coordination, travel, job preparation, actual work, craft allowance, and for checking tools and parts in and out, if required.

Maintained System/Equipment is equipment designated by the FE to be monitored and recorded in the FEEMS Select Equipment List Inventory File. If the item is to be identified and maintained as a system, it will be recorded in the SEL using a System Type Code and System Number for its Select Equipment Identification Number. If the item is to be identified and maintained as a piece of equipment within a system, it will be recorded in the SEL, using a System Type Code, System Number, Equipment Type Code, and Equipment Number for its Select Equipment Identification Number. This equipment must be selected carefully to include only systems and equipment which are critical to the FE mission and on which recurring maintenance cannot be ignored. A Standard Maintenance Procedure entered into FEEMS using a Maintenance Requirement/Procedure record may be written for each maintained system/equipment. FEEMS will match the maintained system/equipment record with the appropriate Maintenance Requirement/Procedure record to automatically produce pre-approved, estimated work orders for each shop.

The Maintenance Requirement/Procedure (MRP) File is a list of recurring MRP records established from the Standard Maintenance Procedures developed by the FE. FEEMS generates maintenance tasks for work order phases by matching the SEL records and the appropriate MRP records using the Select Equipment Identification Number in accordance with the specified Frequency of Maintenance. The MRP records identify the Maintenance Requirement Description, the appropriate shop, Frequency of Maintenance, Crew Size, and Labor Hour Standard.

Maintenance Requirement/Procedure Number/Sequence Number is a unique, two-part number assigned by the FE to each Standard Maintenance Procedure.

Operating Hour Log is an optional monthly record of the Actual Equipment Operating Hours. When the Actual Equipment Operating Hours are entered into FEEMS, this record overrides the Equipment Estimated Used Hours initially entered for an SEL record. The operating hours are used by FEEMS to determine when to schedule the maintenance task when the Frequency of Maintenance is measured in hours. The History File will maintain a record of the estimated and actual equipment operating hours.

Recurring Maintenance Activities include all schedulable maintenance not performed by dedicated operations personnel. They also encompass all activities involving inspection, preventive maintenance, lubrication, and replacement of consumable parts, e.g., belts or filters. Recurring maintenance must be predictable and documented as Standard Maintenance Procedures.

The Recurring Maintenance Task is a recurring maintenance activity for a specified maintained system or equipment (e.g., oiling the motor whose serial number is XYB11327). It is a task which can be documented as a Standard Maintenance Procedure processed by FEEMS at the appropriate frequency and assigned to a specific shop for completion at a given location and time.

The Select Equipment Identification Number (SEID-NO) is a unique identification number for maintained system and equipment records in the Select Equipment List. A maintained system is identified using the first two subfields of the SEID-NO: standard System Type Code, Installation-Unique System Number, Standard Equipment Type Code, and Installation-Unique Equipment Number. The SEID-NO is used whenever a maintained system or equipment needs to be accessed. The SEID-NO is used on the MRP records to assign SMPs to specific systems or equipment, or to all equipment in a specific system, or to all equipment in a specific equipment type.

The Select Equipment List (SEL) File is the FEEMS inventory of maintained systems and equipment. Each SEL record is identified by its appropriate SEID-NO. Other required data include Component Code, Facility Number/Suffix, FEEMS Facility Description, Requestor Identification Code, Equipment Estimated Used Hours, and Number of Items per Record. Other optional SEL data include Location Code, Reimbursable Code, Other Fund Citation, manufacturer data, Equipment Size, Specification Paragraph Number, Drawing Number, Equipment Acquisition cost, and dates related to installation testing, warranty, etc.

Standard Maintenance Procedures (SMP) are written guidance to maintenance crews concerning: (1) the step-by-step procedure to be followed in performing a given maintenance task; (2) special tools and equipment required; (3) spare parts or supplies to be

used; and (4) references to detailed manuals, drawings, designs, or instructions. The SMP also identifies the appropriate shop, Frequency of Maintenance, Labor Hour Standard, and the number of maintenance personnel required to perform the maintenance. The SMPs are maintained in a looseleaf, three-ring notebook and are entered into the FEEMS MRP File in an abbreviated format, using the MRP keypunch form.

The Task File is the FEEMS inventory of recurring maintenance tasks created by matching the SEL records with the appropriate MRP records. The FE controls the contents of this file by making appropriate updates to the SEL and/or the MRP. The Task File is the source of FEEMS Work Orders and the source of status information on the work orders. Maintenance tasks are scheduled from the Task File on the basis of the maintenance interval Frequency Cycle calculated in months (note that hourly frequencies are converted to monthly frequencies, using the Equipment Estimated Used Hour field on the SEL form). This value is used to assign an initial due date when the task enters the Task File. The due date is the month in which the task will be scheduled next. Tasks are initially scheduled in the month that they are input to FEEMS, i.e., the date due is set equal to the month of input to FEEMS. After the task is scheduled, the due date is updated in accordance with task completion: (a) if a task is completed in an allowed time interval (i.e., 1 month for a monthly task, 2 months for a bi-monthly task, and 3 months for a task with a Frequency Cycle of 3 months or more), the due date is set at a value equal to the number of months required for accomplishment plus the Frequency Cycle and is scheduled, or (b) if the task is not completed in the allowed time interval, the due date is augmented by the Frequency Cycle or 3 months (whichever is less), so that the task is rescheduled for the following month. The FE can use this scheduling methodology to control the accomplishment of monthly tasks so that they are rescheduled at the most convenient time. In this manner, the FE can modify the FEEMS assigned due date.

Unaccomplished Tasks in FEEMS are the tasks associated with the FEEMS Work Order phase which has been cancelled. Because some of the tasks within a cancelled phase may have actually been accomplished, FEEMS allows the FE to update the FEEMS Unaccomplished Task List report. The FEEMS

Work Order report is used as a Task Accomplished Turnaround Document which records all tasks accomplished, regardless of whether the FEEMS Work Order phase is completed or cancelled. In this manner, FEEMS purges the Unaccomplished Task List in order to list only the tasks which were actually accomplished.

FEEMS Work Orders are Individual Job Orders (IJO) and are produced automatically by FEEMS. All input data (FA1, FA2, FB1, etc.) required by IFS to establish a work order are automatically produced by FEEMS in punchcard format. The FEEMS Work Orders are produced once every month and contain all work due during the following month. One work order is produced for each recorded Requestor Identification Code, Functional Group Code, and

the appropriate Frequency Cycle. Within each work order a different phase is established for each recorded Facility Number/Suffix, Shop Code, Component Code, Reimbursable Code, Other Fund Citation, and Location Key Code. The FEEMS Work Order is considered approved when the FE approves the SEL and MRP inputs; then the work order is processed directly to the scheduler/shop foremen for completion as time becomes available in the appropriate shop. The labor, equipment, and material hours and costs for FEEMS Work Orders are recorded like all other IFS work orders, i.e., by completing the IFS Labor and Equipment Utilization card and the Material Issue card. FEEMS automatically reports completed FEEMS Work Orders to IFS and deletes work orders cancelled by FEEMS.

FEEMS SELECT EQUIPMENT LIST MASTER RECORD

[illegible]

[illegible]

20

FEEMS OPERATING HOUR LOG

[illegible]**DA FORM 3 (EXAMPLE)**

FEEMS SYSTEM TYPE TABLE

[illegible]

DA FORM 4 (EXAMPLE)

FEEMS EQUIPMENT TYPE TABLE

[illegible]**DA FORM 5 (EXAMPLE)**

[illegible]

COORD-FLAG	SHOP CODE	FREQ-UNIT-CD	FREQUENCY OF MAINTENANCE	CREW-SIZE	LABOR HR STD	HUNDRETHS
52	54	55	56	57	58	59
53	54	55	56	57	58	59
54	55	56	57	58	59	60
55	56	57	58	59	60	61
56	57	58	59	60	61	62
57	58	59	60	61	62	63
58	59	60	61	62	63	64
59	60	61	62	63	64	65
60	61	62	63	64	65	66
61	62	63	64	65	66	67
62	63	64	65	66	67	68
63	64	65	66	67	68	69
64	65	66	67	68	69	70
65	66	67	68	69	70	71

TRNS CD	CHANGE-CD	. SELECT EQUIPMENT IDENTIFICATION NUMBER				MAINT REQMT PROCD		MRP REMARKS
		SYS TYP CD	SYS NO	EQ TYP CD	EQUIP-NO	NUMBER	SEQ-NO	
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
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16								
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50								

24

FEEMS SERIAL NUMBER RANGE

TRANS CD				CHANGE-CD	SERIAL NUMBER RANGE										RESET				INSTL NO								
					LOW					HIGH																	
X	H	V	C																								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				

DA FORM 7 (EXAMPLE)

FEEMS HISTORY SELECTION

[illegible]

DA FORM 8 (EXAMPLE)

[illegible]

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

FEEMS CORRECTION/REPAIR RECORD

TRANS CD		CHANGE-CD	DOCUMENT NUMBER	PHASE-CD	SELECT EQUIPMENT IDENTIFICATION NUMBER																															
					SYS TYP CD	SYS NO	EQ TYP CD	EQUIP-NO																												
X	H	T	U	C	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32

JOB DESCRIPTION	DATE JOB COMPLD																												
	YR	MO	DA																										
33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62

LABOR HRS ACTU	TENTHS	LABOR COST ACTU	MAT COST ACTU	EQUIP COST ACTU													
63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

DA FORM 10 (EXAMPLE)

APPENDIX C:
FEEMS OUTPUT REPORTS

DATE		NOV 77		SYSTEM TYPE LIST										PAGE 1		PCN305	
SYS TYPE CD	SYS NO	SYS DESCR	EQ TYPE CD	EQUIP NO	EQUIP NAME	FACILITY NUMBER	SUF	FAC DESCR	LOC CD KEY	RMK							
220	222C	TEST SYSTEM	3 AA	200F	TEST EQUIP 1	P00480		FAC DESCR	SNE10	214							
220	222C	TEST SYSTEM	3 AA	200G	TEST EQUIP 1	P00480		FAC DESCR	SNE10	214							
330	331	TEST SYSTEM	4			P01842	B	BARRACKS 2 MAINT SYS	TOWER	321							
440	441	TEST SYSTEM	5 CC	904	TEST EQUIP 3	P02066	D		SW								
440	441	TEST SYSTEM	5 CC	907	TEST EQUIP 3	T00115		BLANK LOC-CD									
440	907	TEST SYSTEM	5 CC	908	TEST EQUIP 3	T00115		BLANK NO-ITEMS	SW								
770	777	TEST SYSTEM	8 FF	1	TEST EQUIP 6	P00567		BLDG 101	NE								
770	777	TEST SYSTEM	8 FF	2	TEST EQUIP 6	P00326		BLDG 102	SW								
770	777	TEST SYSTEM	8 FF	3	TEST EQUIP 6	P00376		BLDG 103	SE								
770	777	TEST SYSTEM	8 FF	4	TEST EQUIP 6	P00431		BLDG 104	SW								
770	777	TEST SYSTEM	8 FF	5	TEST EQUIP 6	P00469		BLDG 105	NE								
770	777	TEST SYSTEM	8 FF	6	TEST EQUIP 6	P00470		BLDG 106	NE								
770	777	TEST SYSTEM	8 FF	7	TEST EQUIP 6	P00472		BLDG 107	SE								
770	777	TEST SYSTEM	8 FF	8	TEST EQUIP 6	P00538		BLDG 108	SW								
770	777	TEST SYSTEM	8 FF	9	TEST EQUIP 6	P00539		BLDG 109	NE								
770	777	TEST SYSTEM	8 FF	10	TEST EQUIP 6	P00550		BLDG 110	NW								
770	777	TEST SYSTEM	8 FF	11	TEST EQUIP 6	P00567		BLDG 111	SE								
770	777	TEST SYSTEM	8 FF	12	TEST EQUIP 6	P00568		BLDG 112	SW								
770	777	TEST SYSTEM	8 FF	13	TEST EQUIP 6	P00326		BLDG 102									
770	777	TEST SYSTEM	8 FF	14	TEST EQUIP 6	P00326		BLDG 103	SE								

S Y S T E M N U M B E R L I S T

DATE JAN 78

SYS NO SYS TYPE CD SYS DESCR

121	110	TEST SYSTEM 1
122	110	TEST SYSTEM 1
331	330	TEST SYSTEM 4
441	440	TEST SYSTEM 5
777	770	TEST SYSTEM 8
901	990	TEST SYSTEM 10
907	440	TEST SYSTEM 5
920	990	TEST SYSTEM 10
940	990	TEST SYSTEM 10
222C	220	TEST SYSTEM 3
9999	880	TEST SYSTEM 9

DATE NOV 77

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MAINTAINED EQUIPMENT NUMBER LIST PCN308

EQUIP NO	EQ TYPE CD	SYS NO	SYS TYPE CD	EQUIP NAME	FACILITY NUMBER SUF	LOC CD KEY RMK	NO ITEMS
23	FF	777	770	TEST EQUIP 6	P00567	114	001
24	FF	777	770	TEST EQUIP 6	P00326	SW	010
25	FF	777	770	TEST EQUIP 6	P00326	SW	010
26	FF	777	770	TEST EQUIP 6	P00326	NE	001
27	FF	777	770	TEST EQUIP 6	P00326	25255 666	001
28	FF	777	770	TEST EQUIP 6	P00326	A4444 3	010
29	FF	777	770	TEST EQUIP 6	P00480		001
30	FF	777	770	TEST EQUIP 6	P00480		001
31	FF	777	770	TEST EQUIP 6	P00480	G1234 TOP	001
32	FF	777	770	TEST EQUIP 6	P00480	G1234 ZZZ	010
33	FF	777	770	TEST EQUIP 6	P00480	G1234 TOP	010
34	FF	777	770	TEST EQUIP 6	P00480	G1234 TOP	010
35	FF	777	770	TEST EQUIP 6	P00480	G1234 ZZZ	010
36	FF	777	770	TEST EQUIP 6	P00326	SW	001
37	FF	777	770	TEST EQUIP 6	P00376	SW	001
38	FF	777	770	TEST EQUIP 6	P00431	SW	001
39	FF	777	770	TEST EQUIP 6	P00469	SW	001
40	FF	777	770	TEST EQUIP 6	P00470	SW	001

DATE NOV 77

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MAINTAINED SYSTEM/EQUIPMENT LIST BY FACILITY

PCN309

FACILITY NUMBER	SUF	FEEMS	FAC	DESCR	LOC CD	KEY	RMK	SYS TYPE	SYS CD	SYS NO	EQ TYPE	EQ CD	EQUIP NO	SYS/EQ DESCR
P00472		BLDG	107			SE		770	777	777	FF		7	TEST EQUIP 6
						SW		770	777	777	FF		41	TEST EQUIP 6
P00480		BLDG	113					770	777	777	FF		29	TEST EQUIP 6
								770	777	777	FF		30	TEST EQUIP 6
						G1234	TOP	770	777	777	FF		31	TEST EQUIP 6
						G1234	TOP	770	777	777	FF		33	TEST EQUIP 6
						G1234	TOP	770	777	777	FF		34	TEST EQUIP 6
						G1234	ZZZ	770	777	777	FF		32	TEST EQUIP 6
						G1234	ZZZ	770	777	777	FF		35	TEST EQUIP 6
						SNE10	214	220	222C	AA	AA		200F	TEST EQUIP 1
						SNE10	214	220	222C	AA	AA		200G	TEST EQUIP 1
P00538		BLDG	108			SW		770	777	777	FF		8	TEST EQUIP 6
						SW		770	777	777	FF		42	TEST EQUIP 6
P00539		BLDG	109			NE		770	777	777	FF		9	TEST EQUIP 6
						SW		770	777	777	FF		43	TEST EQUIP 6
P00550		BLDG	110			NW		770	777	777	FF		10	TEST EQUIP 6
						NW		770	777	777	FF		19	TEST EQUIP 6
						SW		770	777	777	FF		44	TEST EQUIP 6
P00567		BLDG	101			NE		770	777	777	FF		1	TEST EQUIP 6

DATE	NOV 77	MAINTENANCE REQUIREMENT/PROCEDURE LIST BY SEID-NO				PCN310	PAGE
EQ TYPE CD	SYS TYPE CD	SYS NO	EQUIP NO	MAINT REQMT PROCED-NO	MAINT REQMT DESCR	SHOP CD	FREQ
	220			AA40 1	GREASE	51X	H2000000
	220	222C		AA50 1	INSPECT	42X	M0003000
	330	331		DD40 1	GREASE	62X	M0006000
	880			GG10 1	OIL	51X	M0001000
	880	888		HH10 1	CHANGE	52X	H1000000
AA				AA20 1	CHECK	50X	M0002000
AA				PP20 1	CLEAN	41X	M0001000
AA				PP30 1	REPLACE	41X	M0001000
AA	220			AA30 1	INSPECT ELEC PARTS	53X	R1011120
AA	220			AA30 2	INSPECT MECH PARTS	51X	R1011120
AA	220	222C		AA50 1	REPLACE	65X	M0006000
AA	220	222C	200G	AA10 1	OIL	51X	M0001000
AA	990			PP10 1	INSPECT	41X	N0002000
AA	990			PP10 2	INSPECT	50X	M0002000
FF				FF10 1	INSPECT	41X	M0001000
FF				FF20 1	INCREASE	41X	M0002000
FF				FF30 1	DECREASE	41X	M0003000
FF				FF40 1	OIL	41X	M0012000
FF				FF50 1	REPLAC	41X	H2000000
FF				FF60 1	GREASE	41X	R1112000

DATE	NOV 77	MAINTENANCE REQUIREMENT/PROCEDURE LIST BY MRP-NO										PCN311	PAGE 1
MAINT REQMT PROCED-NO	MAINT REQMT DESCR	SHOP CD	FREQ	SYS TYPE CD	SYS NO	EQ TYPE CD	EQUIP NO						
AA10 1	OIL	51X	M00010000	220	222C	AA	200G						
AA20 1	CHECK	50X	M00020000			AA							
AA30 1	INSPECT ELEC PARTS	53X	R10111200	220		AA							
AA30 2	INSPECT MECH PARTS	51X	R10111200	220		AA							
AA40 1	GREASE	51X	H20000000	220									
AA50 1	INSPECT	42X	M00030000	220	222C								
AA50 1	REPLACE	65X	M00060000	220	222C	AA							
DD40 1	GREASE	62X	M00060000	330	331								
FF10 1	INSPECT	41X	M00010000			FF							
FF20 1	INCREASE	41X	M00020000			FF							
FF30 1	DECREASE	41X	M00030000			FF							
FF40 1	OIL	41X	M00120000			FF							
FF50 1	REPLAC	41X	H20000000			FF							
FF60 1	GREASE	41X	R11120000			FF							
FF70 1	OIL	41X	M00020000			FF							
FF80 1	WASH	41X	H07000000			FF							
FF90 1	INSPECT	41X	H13000000			FF							
GG10 1	OIL	51X	M00010000	880									
GG20 1	GREASE	41X	M00010000	770		FF							
GG30 1	CHANGE	41X	M00010000	770	777	FF							
GG30 1	CHGE	41X	M00010000	770	771	FF							

DATE NOV 77
PCN312
MAINTENANCE REQUIREMENT/PROCEDURE LIST BY SHOP
(MASTER MRP LIST)

SHOP CD	MAINT REQMT PROCED NO	MAINT REQMT DESCR	COORD FLAG	FREQ	CR SZ	LABOR HR STD	REMARKS	SYS TYPE CD	SYS NO CD	EQUIP NO	DATE ENTER
41X	FF10 1	INSPECT	1	M00010000	1	1.00	CHECK SMP BOOK	FF			771115
41X	FF20 1	INCREASE	1	M00020000	1	2.00	CHECK SPECIAL TOOL LIST	FF			771115
41X	FF30 1	DECREASE	1	M00030000	1	1.00	MANUAL M-420-6	FF			771115
41X	FF40 1	OIL	1	M00120000	1	.50	SPARE PARTS MAY BE NEEDED	FF			771115
41X	FF50 1	REPLAC	1	H20000000	1	1.00	SYNTHETIC OIL REQUIRED	FF			771115
41X	FF60 1	GREASE	1	R11120000	1	2.00	BRING GREASE GUN	FF			771115
41X	FF70 1	OIL	1	M00020000	1	1.00		FF			771115
41X	FF80 1	WASH	1	H07000000	1	1.00		FF			771115
41X	FF90 1	INSPECT	1	H13000000	1	1.00		FF			771115
41X	GG20 1	GREASE	1	M00010000	1	1.00	BRING GREASE GUN	770			771115
41X	GG30 1	CHGE	1	M00010000	1	2.00		770	771		771115
41X	GG30 1	CHANGE	1	M00010000	1	2.00	FILTER 20 X 20	770	777		771115
41X	GG40 1	REPLACE	1	M00010000	1	1.00		770			771115
41X	GG50 1	CLEAN	1	M00010000	1	1.50	BRING BRUSH	770	777		771115
41X	GG50 1	CLEAN	1	M00010000	1	1.50		770	771		771115
41X	GG60 1	OIL	1	M00010000	1	3.00		770	771	1	771115
41X	GG60 1	OIL	1	M00010000	1	3.00		770	777	1	771115
41X	PP10 1	INSPECT	N	M00020000	2	1.00		990			771115
41X	PP20 1	CLEAN	1	M00010000	1	1.00		770	777	2	771115
41X	PP20 1	CLEAN	1	M00010000	1	1.00		AA			771115
41X	PP30 1	REPLACE	1	M00010000	1	1.00	O-RING	AA			771115
41X	RR10 1	CHECK	1	R01020611	2	1.00	REMEMBER CHECK LIST	FF			771115

NUMBER OF MRP RECORDS FOR THIS SHOP: 22

37

DOC NO	PH CD	DATE SCHD	TASKS SCHD	TASKS COMPLD	LABOR HRS EST	LABOR HRS ACTU	MAT COST ACTU	EQ COST ACTU	TOTAL COST
NEW WORK ORDER PHASES - SPECIFIED FREQUENCY:									
EJ800130J	01	7712	01		002				
EJ800130J	02	7712	01		002				
EJ800130J	03	7712	01		002				
EJ800130J	04	7712	02		004				
EJ800130J	05	7712	02		004				
NEW WORK ORDER PHASES - MONTHLY:									
EJ800158J	13	7712	06		008				
EJ800155J	14	7712	06		008				
EJ800158J	15	7712	06		008				
EJ800158J	16	7712	12		016				
EJ800168J	01	7712	06		008				
NEW WORK ORDER PHASES - BI-MONTHLY:									
EJ800118J	01	7711	03		004				
EJ800118J	02	7711	06		008				
EJ800118J	03	7711	03		004				
NEW WORK ORDER PHASES - QUARTERLY:									
EJ800078J	01	7711	03		003				
EJ800078J	02	7711	03		003				
EJ800078J	03	7711	03		003				
IN-PROCESS WORK ORDER PHASES - MONTHLY:									
FL800028J	01	7711	02	00	002				
FL800028J	02	7711	02	00	002				
IN-PROCESS WORK ORDER PHASES - BI-MONTHLY:									
EJ800058J	01	7711	03	00	004				
EJ800058J	02	7711	03	00	004				
EJ800058J	03	7711	03	00	004				
IN-PROCESS WORK ORDER PHASES - QUARTERLY:									
EJ800078J	01	7711	03	00	003				
EJ800078J	02	7711	03	00	003				
COMPLETED WORK ORDER PHASES:									
EJ800018J	01	7711	02	02	003.0	003.0	\$ 84	\$ 5	\$ 121
EJ800018J	02	7711	02	02	003.0	003.0	\$ 0	\$ 0	\$ 32
EJ800018J	03	7711	02	02	003.0	003.0	\$ 550	\$ 0	\$ 581
EJ800018J	04	7711	04	04	006.0	006.0	\$ 0	\$ 0	\$ 46
CANCELLED WORK ORDER PHASES:									
EJ800018J	06	7711	02	00	003.0	000.0	\$ 0	\$ 0	\$ 0
EJ800028J	01	7711	02	00	003.0	000.0	\$ 0	\$ 0	\$ 0
EJ800028J	02	7711	04	00	006.0	000.0	\$ 0	\$ 0	\$ 0
EJ800038J	01	7711	06	00	008.0	000.0	\$ 0	\$ 0	\$ 0

FEEMS UNACCOMPLISHED TASK LIST																	PCN300	PAGE	1
STRUCT SHOP 41X																			
SYS TYPE	SYS NO	EQ TYPE	EQUIP NO	SYS/EQ DESC	FACILITY NUMBER	SUF	LOC CD	KEY	RMK	MAINT PROCED NO	MAINT REQMT	DESCR	NO ITEMS	LABOR HR STD	DATE SCHD	DATE LAST			
770	777	FF	1	TEST EQUIP 6	P00567		NE			FF30 1	DECREASE		001	001.00	7711	0000			
770	777	FF	1	TEST EQUIP 6	P00567		NE			FF40 1	OIL		001	000.50	7711	0000			
770	777	FF	1	TEST EQUIP 6	P00567		NE			FF50 1	REPLAC		001	001.00	7711	0000			
770	777	FF	1	TEST EQUIP 6	P00567		NE			RR10 1	CHECK		001	001.00	7801	0000			
770	777	FF	2	TEST EQUIP 6	P00326		SW			FF10 1	INSPECT		001	001.00	7801	7801			
770	777	FF	2	TEST EQUIP 6	P00326		SW			FF30 1	DECREASE		001	001.00	7711	7712			
770	777	FF	2	TEST EQUIP 6	P00326		SW			FF40 1	OIL		001	000.50	7711	7712			
770	777	FF	2	TEST EQUIP 6	P00326		SW			FF50 1	REPLAC		001	001.00	7711	7712			
770	777	FF	2	TEST EQUIP 6	P00326		SW			FF80 1	WASH		001	001.00	7801	7801			
770	777	FF	2	TEST EQUIP 6	P00326		SW			GG30 1	CHANGE		001	002.00	7801	7801			
770	777	FF	2	TEST EQUIP 6	P00326		SW			GG40 1	REPLACE		001	001.00	7801	7801			
770	777	FF	2	TEST EQUIP 6	P00326		SW			GG50 1	CLEAN		001	001.50	7801	7801			
770	777	FF	2	TEST EQUIP 6	P00326		SW			PP20 1	CLEAN		001	001.00	7801	7801			
770	777	FF	2	TEST EQUIP 6	P00326		SW			RR10 1	CHECK		001	001.00	7801	7712			
770	777	FF	3	TEST EQUIP 6	P00376		SE			FF10 1	INSPECT		001	001.00	7801	7801			
770	777	FF	3	TEST EQUIP 6	P00376		SE			FF80 1	WASH		001	001.00	7801	7801			
770	777	FF	3	TEST EQUIP 6	P00376		SE			GG30 1	CHANGE		001	002.00	7801	7801			
770	777	FF	3	TEST EQUIP 6	P00376		SE			GG40 1	REPLACE		001	001.00	7801	7801			
770	777	FF	3	TEST EQUIP 6	P00376		SE			GG50 1	CLEAN		001	001.50	7801	7801			
770	777	FF	3	TEST EQUIP 6	P00376		SE			RR10 1	CHECK		001	001.00	7801	0000			
770	777	FF	5	TEST EQUIP 6	P00469		NE			FF10 1	INSPECT		005	001.00	7801	7801			
770	777	FF	5	TEST EQUIP 6	P00469		NE			FF30 1	DECREASE		005	001.00	7711	0000			
770	777	FF	5	TEST EQUIP 6	P00469		NE			FF40 1	OIL		005	000.50	7711	0000			
770	777	FF	5	TEST EQUIP 6	P00469		NE			FF50 1	REPLAC		005	001.00	7711	0000			

DATE	FEB 78	FEEMS YEARLY WORKLOAD PROJECTION (STD HRS) FROM 7802 TO 7901												PAGE 1
SHOP CD	SHOP NAME	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL STD HRS
41X	STRUCT SHOP	306	705	384	527	418	473	306	551	340	483	374	473	5,340
50X	UTILITIES OFC	0	1	0	1	0	1	0	1	0	1	0	1	6
51X	MECH SHOP	7	7	7	15	5	5	5	5	5	11	5	5	82
53X	ELECT SHOP	7	8	4	8	7	7	3	2	10	3	2	2	63
62X	WATER PLANT	0	1	0	0	0	0	0	1	0	0	0	0	2
63X	SEWAGE PLANT	2	2	2	2	2	2	2	2	2	2	2	2	24
65X	ELECT ECTC	3	5	3	3	3	3	3	5	3	3	3	3	40

FEEMS HISTORY DETAIL

SYS TYPE NO	EQ TYPE	EQ NO	FACILITY	LOC CD	NO ITEMS	SYS/EQ DESCR	MANUF NAME	MODEL NO	EQ SIZE AMT UM	EQUIP ACON COST	DATE INSTLD
770	777	FF	13	P00326	001	TEST EQUIP 6	BELL	48A345	02000LB	\$7525	770512

DATE ENTERED: 771115
DATE ENTERED: 771215
DATE ENTERED: 780115

COMMENT: HISTORICAL COMMENT TO NOTE CHANGE
COMMENT: NOTE HIGH RECORD OF BREAKDOWNS
COMMENT: MONITOR OPER HOURS

FEEMS MAINTENANCE:

MAINT REQMT PROCED NO	FREQ	LBR HR STD	DATE SCHED	DATE COMPLD	TASKS SCHED	TASKS COMPLD	LABOR HRS	LABOR COST	MATERIAL COST	EQUIP COST	TOTAL COST	DOC NO	PH CD
FF10 1	M00010000	1.00	7801	7802	2	2	2.0	\$12	\$42	\$1	\$55	EJ800218J	01
FF60 1	R11120000	2.00	7712	7801	2	2	4.0	\$31	\$153	\$2	\$186	EJ800138J	01
FF80 1	H07000000	1.00	7801	7802	2	2	2.0	\$12	\$42	\$1	\$55	EJ800218J	01
GG30 1	M00010000	2.00	7801	7802	2	2	4.0	\$22	\$59	\$1	\$82	EJ800218J	01
GG40 1	M00010000	1.00	7801	7802	2	2	2.0	\$12	\$42	\$1	\$55	EJ800218J	01
GG50 1	M00010000	1.50	7801	7802	2	2	3.0	\$17	\$50	\$1	\$68	EJ800218J	01
RR10 1	R01020611	1.00	7711	7712	1	1	1.0	\$10	\$28	\$1	\$39	EJ800018J	01
YTD TOTAL:							13	18.0	\$116	\$416	\$8	\$540	

CORRECTION/REPAIR MAINTENANCE:

DOC NO	PH CD	JOB DESCR	DATE COMPLD	LABOR HRS	LABOR COST	MATERIAL COST	EQUIP COST	TOTAL COST
FE890018J	01	REPAIR COMPONENTS	771130	105.0	\$1100	\$0	\$0	\$1100
FE005358J	01	REPLACE DAMAGED MOTOR	771205	30.5	\$375	\$552	\$62	\$989
GM000458J	01	/FEEMS SERVICE	780115	45.1	\$520	\$195	\$100	\$1815
CG200018				.4	\$56	\$60	\$2	\$118
YTD TOTAL:				181.0	\$2051	\$1807	\$164	\$4022
GRAND TOTAL OF FEEMS MAINT + C/R MAINT:				199.0	\$2167	\$2223	\$172	\$4562

EQUIP OPERATING HRS:

EQUIP HRS EST	ACTUAL EQ OPERATING HOURS IF DIFFERENT THAN ESTIMATE
AS OF 77 11	OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP
744	500 480

DATE: FEB 78

FEEMS HISTORY SUMMARY

PCN303 PAGE 10

SYS TYPE CD	SYS EQ TYPE CD	EQ NO	FACILITY	LOC CD	NO ITEMS	SYS/EQ DESCR	MANUF NAME	MODEL NO	EQ SIZE AMT UM	EQUIP ACON COST	DATE INSTLD
770	777	FF	13	P00326	001	TEST EQUIP 6	BELL	48A345	02000LB	\$7525	770612

COMMENT: HISTORICAL COMMENT TO NOTE CHANGE
 COMMENT: NOTE HIGH RECORD OF BREAKDOWNS
 COMMENT: MONITOR OPER HOURS

DATE ENTERED: 771115
 DATE ENTERED: 771215
 DATE ENTERED: 780115

FEEMS MAINTENANCE:

TASKS SCHED	TASKS COMPLD	LABOR HRS	LABOR COST	MATERIAL COST	EQUIP COST	TOTAL COST
13	13	18.0	\$116	\$416	\$8	\$540

YTD TOTAL:

CORRECTION/REPAIR MAINTENANCE:

LABOR HRS	LABOR COST	MATERIAL COST	EQUIP COST	TOTAL COST
181.0	\$2051	\$1807	\$164	\$4022

YTD TOTAL: 181.0 \$2051 \$1807 \$164 \$4022
 GRAND TOTAL OF FEEMS MAINT + C/R MAINT: 199.0 \$2167 \$2223 \$172 \$4562

EQUIP OPERATING HRS:

EQUIP HRS EST AS OF 77 11 OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP

744 500 480

SYS TYPE CD	SYS EQ TYPE CD	EQ NO	FACILITY	LOC CD	NO ITEMS	SYS/EQ DESCR	MANUF NAME	MODEL NO	EQ SIZE AMT UM	EQUIP ACON COST	DATE INSTLD
770	777	FF	15	P00326	SE	001 TEST EQUIP 6	KWART	M14	00012LB	\$300	700413

FEEMS MAINTENANCE:

TASKS SCHED	TASKS COMPLD	LABOR HRS	LABOR COST	MATERIAL COST	EQUIP COST	TOTAL COST
8	8	11.5	\$24	\$62	\$0	\$86

YTD TOTAL:

EQUIP OPERATING HRS:

EQUIP HRS EST AS OF 77 11 OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP

744

**APPENDIX D:
STANDARD SEID-NO SUBFIELD CODES**

D.1 STANDARD SYSTEM TYPE CODES

System Type Code	System Description
110	Heating Generation
120	Heating Distribution
130	Heating Controls
210	Chilled Water Generation
220	Chilled Water Distribution
230	Air-Conditioning Components
310	Ventilating
410	Plumbing, Water
420	Plumbing, Medical Gas
430	Plumbing, Sewage and Waste
440	Plumbing, Fuel
450	Plumbing, Fixtures
460	Plumbing, Controls
470	Plumbing, Steam
510	Electrical Generation
520	Electrical Distribution
530	Lighting
540	Electrical Interior
610	Equipment, Communications
620	Equipment, Food Service
630	Equipment, Laboratory
640	Equipment, Shop
650	Equipment, Maintenance
660	Equipment, Emergency
670	Equipment, Waste and Garbage
680	Equipment, Internal Transportation
690	Equipment, Specialized
710	Water Treatment
720	Sewage Treatment
810	Water Storage
820	Fuel Storage
910	Steam Generation

D.2 STANDARD EQUIPMENT TYPE CODES

Equipment Type Code	Equipment Description	Equipment Type Code	Equipment Description
A1	Aerator	F1	Fan
A2	Air Handling Unit	F2	Faucet
A3	Alarm	F3	Filter
A4	Annunciator	F4	Food Preparation Equipment
A5	Air Separator	F5	Food Serving Equipment
		F6	Food Storage Equipment
B1	Ballast	F7	Fountain
B2	Bath	F8	Furnace
B3	Battery		
B4	Battery Charger	G1	Gauge
B5	Blower	G2	Generator
B6	Boiler	G3	Grill
B7	Bubbler—Swimming Pool	G4	Grounding Equipment
C1	Cabinet, Warming (Food Service)	H1	Heat Exchanger
C2	Cable	H2	Hoist
C3	Capacitor	H3	Hood
C4	Chemical Additive Equipment	H4	Humidifier
C5	Chlorinator	H5	H-V Unit
C6	Circuit Breaker	H6	Hydrant
C7	Clock	H7	Hydrochlorinator
C8	Cock	H8	Heater Unit
C9	Coil	H9	Humidistat
CA	Combustion Chamber		
CB	Compressor	I1	Incinerator
CC	Condenser	I2	Irrigation Equipment
CD	Connector	I3	Ice Maker
CE	Control Panel		
CF	Cooler	K1	Kitchen-Washing Equipment
CG	Cooling Tower		
CH	Chiller	L1	Lamp
CI	Counter	L2	Lighting Fixture
CJ	Counter, Dietary	L3	Lighting Exterior
CK	Counter, Medicine	L4	Line Isolation Monitor
D1	Damper	M1	Manhole
D2	Deaerator	M2	Measuring Instrument
D3	Dimmer	M3	Medical Gas
D4	Disposer	M4	Meter
D5	Drain	M5	Motor (<1 hp)
D6	Dryer	M6	Motor (1-5 hp)
D7	Duct	M7	Motor (>5 hp)
D8	Dumbwaiter	M8	Muffler
D9	Dust Collector	M9	Mains
DA	Door	MA	Mixing Box
		MB	Manometer
E1	Elevator	MC	Motor Control Center
E2	Extinguisher		
		P1	Pipe and Accessories

Equipment Type Code	Equipment Description	Equipment Type Code	Equipment Description
P2	Pipe Insulation	S9	Strainer
P3	Pneumatic Tube	SA	Substation
P4	Pool, Swimming	SB	Switch
P5	Power Lines	SC	Sterilizer
P6	Pump	SD	Steam Turbine
P7	Pump, Circulating	T1	Tank
P8	Panelboard	T2	Thermometer
R1	Raceway	T3	Transformer
R2	Radiator	T4	Trap
R3	Refrigeration Equipment	T5	Trayveyor, Conveyor
R4	Regulator	T6	Thermostat
R5	Reservoir	T7	Troffer Light
R6	Retriever	U1	Urinal
R7	Refrigerated Room	V1	Vacuum Breaker
R8	Receptacle	V2	Vacuum Cleaner
R9	Register	V3	Valve
S1	Scale	V4	Vent
S2	Shower	V5	Vacuum Pump
S3	Signal	W1	Washer
S4	Sink, Lavatory	W2	Water Closet
S5	Special Security and Disbursement Door	W3	Water Heater
S6	Sprinkler Equipment	W4	Water Softener
S7	Steam Separator	W5	Water Still
S8	Starter Magnetic		

APPENDIX E:
SMP EXAMPLES

SVC AERATOR

MRP-NO AE20

SEQ-NO 1

PAGE 1

FEEMS MAINTENANCE REQUIREMENT/PROCEDURE

TRANS CD		SELECT EQUIPMENT IDENTIFICATION NUMBER				MAINT REQMT PROCED		MAINTENANCE REQUIREMENT DESCRIPTION	
CHANGE-CD		SYS TYP CD	SYS NO	EQ TYP CD	EQUIP-NO	NUMBER	SEQ-NO		
X	H 5	A			AL			AE20	SVC AERATOR, ETHYLEN OX GS
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51									

SHOP CODE		FREQ-UNIT-CD		FREQUENCY OF MAINTENANCE		CREW-SIZE		LABOR HR STD	
COORD-FLAG	N	25	XM	03		L		L	40
52	53	54	55	56	57	58	59	60	61
62	63	64	65	66	67	68	69	70	71

TRANS CD		SELECT EQUIPMENT IDENTIFICATION NUMBER				MAINT REQMT PROCED		MRP REMARKS	
CHANGE-CD		SYS TYP CD	SYS NO	EQ TYP CD	EQUIP-NO	NUMBER	SEQ-NO		
X	H 6	A			AL			AE20	VAC CLEANER+FILTER
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

SVC AERATOR

MRP-NO AE10
SEQ-NO 1
PAGE 2

SPECIAL TOOLS AND EQUIPMENT:

1. Vacuum cleaner

SPARE PARTS:

1. Air filters, bacteria-retentive
2. Mild detergent solution

PROCEDURE:

1. Coordination if Multi-Shop Column = N; check with Branch Chief.
2. Inspect air outlets for blockage.
3. Oil door hinges.
4. Inspect door gasket. Replace as required.

REFERENCES:

1. 27, Ethylene Oxide Gas Aerator Equipment Manual.

FEEMS MAINTENANCE REQUIREMENT/PROCEDURE

TRANS CD	CHANGE-CD	SELECT EQUIPMENT IDENTIFICATION NUMBER				MAINT REQMT PROCED	MAINTENANCE REQUIREMENT DESCRIPTION																																											
		SYS TYP CD	SYS NO	EQ TYP CD	EQUIP-NO																																													
X H 5	A 5	L 0	5	L 6 L		GBL 0 LCK	AIR TANK PRESSUR GAUGE																																											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51

COORD-FLAG	SHOP CODE	FREQ-UNIT-CD	FREQUENCY OF MAINTENANCE	CREW-SIZE	LABOR HR STD	HUNDREDS													
							T	4	5	X	M	0	6	L	5	0			
52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71

TRANS CD	CHANGE-CD	SELECT EQUIPMENT IDENTIFICATION NUMBER				MAINT REQMT PROCED	MRP REMARKS																																										
		SYS TYP CD	SYS NO	EQ TYP CD	EQUIP-NO																																												
X H 6	A 5	L 0	5	L 6 L		GBL 0 LCK	WRENCH + GAUGE																																										
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50

SPECIAL TOOLS AND EQUIPMENT:

1. Crescent wrench
2. Open end wrench (correct size for end of pressure gauge)
3. Pipe wrench (10 in. or 12 in. for hold back)
4. Direct pressure reading gauge.

SPARE PARTS:

1. Extra pressure gauge
2. Short nipples (1/4 in. or 3/8 in.)
3. Bushings (1/2 in. X 1/4 in. and 1/2 in. X 3/8 in.)
4. Pipe thread sealant.

PROCEDURE:

1. Check pipe going to pressure gauge for leaks. If it leaks, take it apart and redope it.
2. Turn off pressure on line to gauge. Relieve pressure on line between gauge and valve, if possible; then turn valve back on and see if gauge registers the same amount of pressure as before. If so, gauge is working properly.
3. Clean glass on face of gauge.
4. Check gauge for pressure reading.
5. Close valve to gauge.
6. Remove gauge from system and inspect gauge for wear and evidence of internal leakage.
7. Install direct pressure gauge and take reading.
8. If system gauge is different from direct pressure gauge reading, calibrate system gauge; if unable to do this, replace gauge with new one.
9. Remove direct pressure gauge and reinstall system gauge; check for operation and leaks.
10. Other maintenance as required.

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